

Application No. 10/571,998
Amendment dated July 28, 2008
Reply to Non-Final Office Action of April 29, 2008

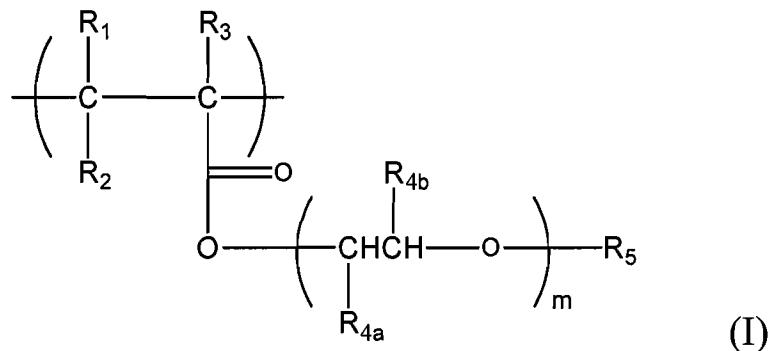
Docket No.: 20241/0207047-US0

It is believed that no additional fees are required for this Response. However, should additional fees be necessary in connection with the filing of this Response, or if a petition for extension of time is required for timely acceptance of the same, the Commissioner is hereby authorized and requested to charge Deposit Account No. 04-0100 for any such fees, and Applicant hereby petitions for any needed extension of time.

AMENDMENTS TO THE CLAIMS

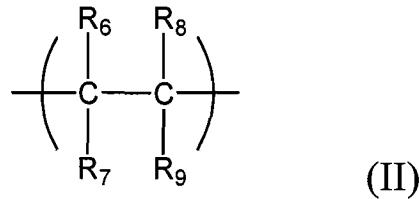
The following listing of claims replaces all prior versions, and listings, of claims in this application.

Claim 1 (Currently Amended): A composition for a polymer solid electrolyte comprising a copolymer having repeating units represented by Formula (I):



wherein each of R₁ to R₃ independently represents a hydrogen atom or a C1-C10 hydrocarbon group; R₁ and R₃ may bond to one another to form a ring; each of R_{4a} and R_{4b} independently represents a hydrogen atom or a methyl group; R₅ represents a hydrogen atom, a hydrocarbon group, an acyl group or a silyl group; m is an integer of 1 to 100, and each of R_{4a} and each of R_{4b} may be the same or different when m is 2 or more;

and repeating units represented by Formula (II):



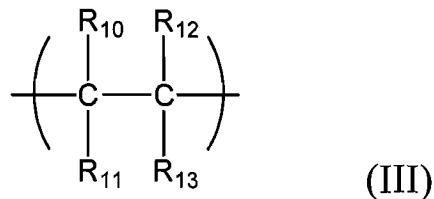
wherein each of R_6 and R_8 independently represents a hydrogen atom or a C1-C10 hydrocarbon group; R_6 and R_8 may bond to one another to form a ring; R_7 represents a hydrogen atom, a C1-C10 hydrocarbon group, a hydroxyl group, a hydrocarbonoxy group, a carboxyl group, an acid anhydride group, an amino group, an ester group, or an organic group having at least one functional group selected from the group consisting of hydroxyl group, carboxyl group, three-membered-ring epoxy group, acid anhydride group and amino group; and R_9 represents an organic group having at least one functional group selected from the group consisting of hydroxyl group, carboxyl group, three-membered-ring epoxy group, acid anhydride group and amino group;

and an electrolyte salt.

Claims 2-8 (Canceled).

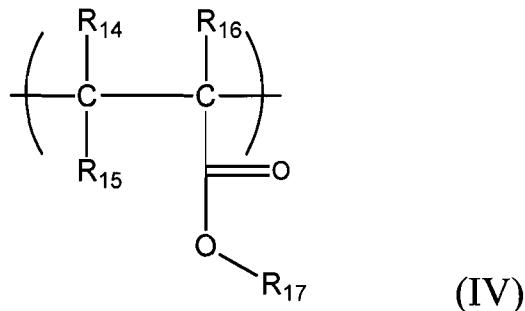
Claim 9 (Currently Amended): The composition for a polymer solid electrolyte according to Claim [[1]]1, the copolymer further comprising a repeating unit derived from a polymerizable unsaturated monomer, which is different from the repeating units represented by Formula (I) and Formula (II).

Claim 10 (Previously Presented): The composition for a polymer solid electrolyte according to Claim 9, wherein the repeating unit derived from polymerizable unsaturated monomers comprises at least one repeating unit selected from the group consisting of units represented by Formula (III)



wherein each of R_{10} to R_{12} independently represents a hydrogen atom or a C1-C10 hydrocarbon group, and R_{13} represents an aryl group or a heteroaryl group;

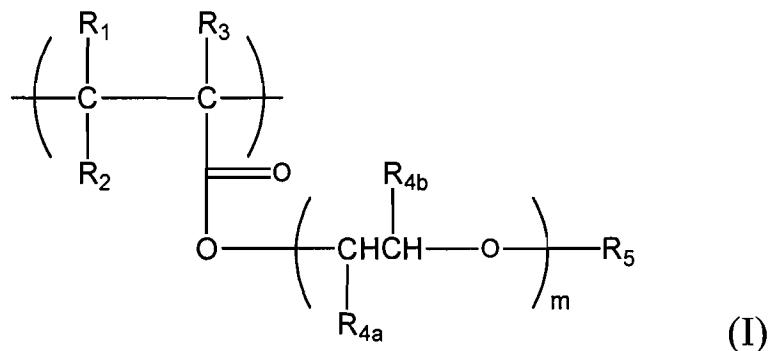
and units represented by Formula (IV)



wherein each of R₁₄ to R₁₆ independently represents a hydrogen atom or a C1-C10 hydrocarbon group; R₁₄ and R₁₆ may bond to one another to form a ring; and R₁₇ represents a C1-C12 alkyl group, an aryl group, an alicyclic hydrocarbon group, or a heterocyclic group.

Claims 11-24 (Canceled).

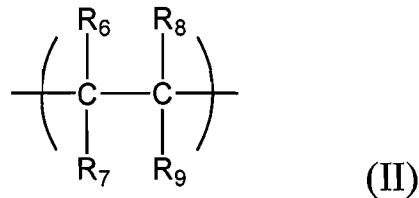
Claim 25 (Currently Amended): A polymer solid electrolyte comprising:
a copolymer having repeating units represented by Formula (I):



wherein each of R₁-R₃ independently represents a hydrogen atom or a C1-C10 hydrocarbon group; R₁ and R₃ may bond to one another to form a ring; each of R_{4a} and R_{4b} independently represents a hydrogen atom or a methyl group; R₅ represents a hydrogen atom, a hydrocarbon group, an acyl

group or a silyl group; m is an integer of 1 to 100, and each of R_{4a} and R_{4b} may be the same or different when m is 2 or more;

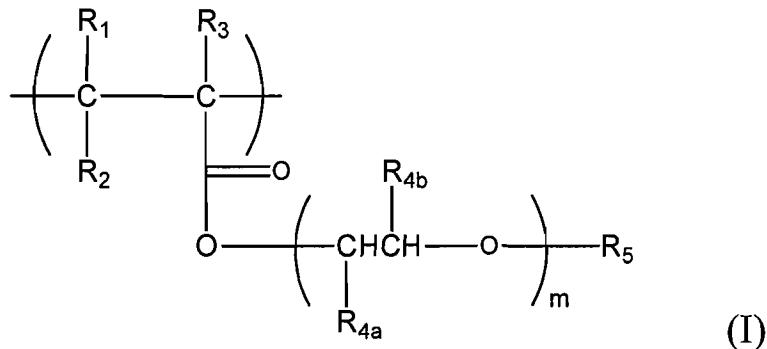
and repeating units represented by Formula (II):



wherein each of R₆ and R₈ independently represents a hydrogen atom or a C1-C10 hydrocarbon group; R₆ and R₈ may bond to one another to form a ring; R₇ represents a hydrogen atom, a C1-C10 hydrocarbon group, a hydroxyl group, a hydrocarbonoxy group, a carboxyl group, an acid anhydride group, an amino group, an ester group, or an organic group having at least one functional group selected from the group consisting of hydroxyl group, carboxyl group, three-membered-ring epoxy group, acid anhydride group and amino group; and R₉ represents an organic group having at least one functional group selected from the group consisting of hydroxyl group, carboxyl group, three-membered-ring epoxy group, acid anhydride group and amino group;

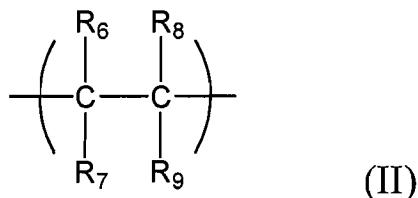
and an electrolyte salt.

Claim 26 (Currently Amended): A polymer solid electrolyte comprising:
a cross-linked polymer obtained by a reaction of a cross-linking agent with a copolymer
having repeating units represented by Formula (I):



wherein each of R₁-R₃ independently represents a hydrogen atom or a C1-C10 hydrocarbon group; R₁ and R₃ may bond to one another to form a ring; each of R_{4a} and R_{4b} independently represents a hydrogen atom or a methyl group; R₅ represents a hydrogen atom, a hydrocarbon group, an acyl group or a silyl group; m is an integer of 1 to 100, and each of R_{4a} and each of R_{4b} may be the same or different when m is 2 or more;

and repeating units represented by Formula (II):



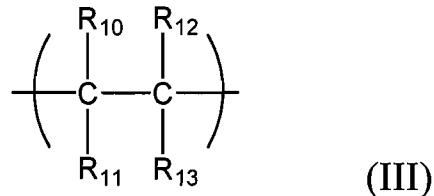
wherein each of R₆ and R₈ independently represents a hydrogen atom or a C1-C10 hydrocarbon group; R₆ and R₈ may bond to one another to form a ring; R₇ represents a hydrogen atom, a C1-C10 hydrocarbon group, a hydroxyl group, a hydrocarbonoxyl group, a carboxyl group, an acid anhydride group, an amino group, an ester group, or an organic group having at least one functional group selected from the group consisting of hydroxyl group, carboxyl group, three-membered-ring epoxy group, acid anhydride group and amino group; and R₉ represents an organic group having at least one functional group selected from the group consisting of hydroxyl group, carboxyl group, three-membered-ring epoxy group, acid anhydride group and amino group;

and an electrolyte salt.

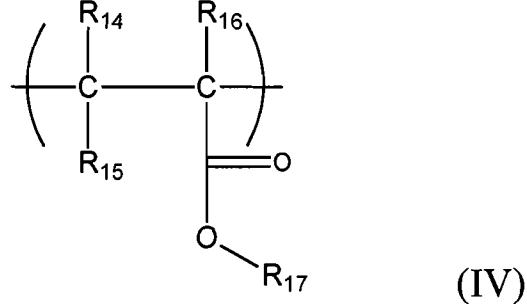
Claims 27-32 (**Canceled**).

Claim 33 (Currently Amended): The polymer solid electrolyte according to Claim 25, wherein the copolymer further ~~comprising~~comprises a repeating unit derived from a polymerizable unsaturated monomer, which is different from the repeating units represented by the Formula (I) and the Formula (II).

Claim 34 (Previously Presented): The polymer solid electrolyte according to Claim 33, wherein the repeating unit derived from polymerizable unsaturated monomers is at least one repeating unit selected from the group consisting of units represented by Formula (III)



wherein each of R₁₀ to R₁₂ independently represents a hydrogen atom or a C1-C10 hydrocarbon group, and R₁₃ represents an aryl group or a heteroaryl group;
and units represented by Formula (IV)



wherein each of R₁₄ to R₁₆ independently represents a hydrogen atom or a C1-C10 hydrocarbon group; R₁₄ and R₁₆ may bond to one another to form a ring; and R₁₇ represents a C1-C12 alkyl group, an aryl group, an alicyclic hydrocarbon group, or a heterocyclic group.

Claims 35-50 (**Canceled**).

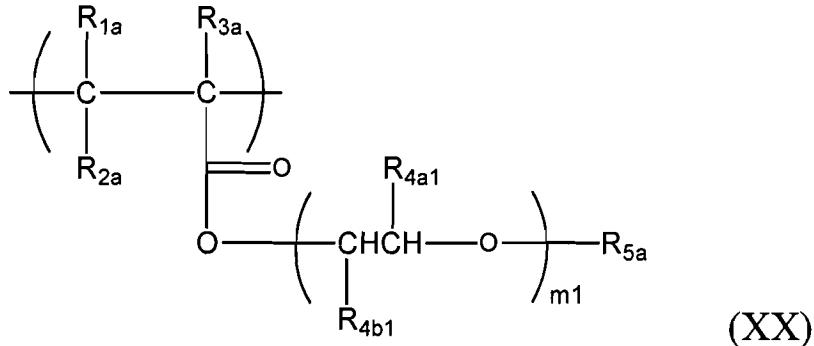
Claim 51 (Withdrawn): A polymer comprising; a polymer segment (P1) having an ion-conductivity, a polymer segment (P2) not having an ion-conductivity, and a polymer segment (P3) having a cross-linking point, the polymer being disposed in an order of P3, P2, P1, P2, and P3.

Claim 52 (**Canceled**).

Claim 53 (Withdrawn): A polymer solid electrolyte comprising a cross-linked polymer obtained by a reaction of a polymer with a cross-linking agent, and an electrolytic salt, wherein the polymer includes a polymer segment (P1) having an ion-conductivity, a polymer segment (P2) not having an ion-conductivity, and a polymer segment (P3) having a cross-linking point, the polymer being disposed in an order of P3, P2, P1, P2, and P3.

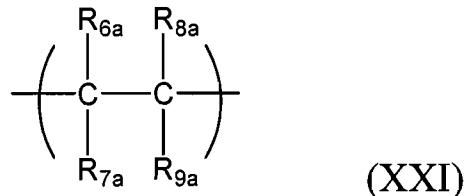
Claims 54-55 (**Canceled**).

Claim 56 (Currently Amended): A polymer solid electrolyte battery comprising an electrode which comprises an electrode-activating compound and a copolymer including a disposition of block chains arranged in an order of B11, A11 and C11, wherein the block chain A11 includes a repeating unit represented by Formula (XX)



wherein each of R_{1a} [[and]] to R_{3a} independently represents a hydrogen atom or a C1-C10 hydrocarbon group; R_{1a} and R_{3a} may bond to one another to form a ring; each of R_{4a1} and R_{4b1} independently represents a hydrogen atom or a methyl group; R_{5a} represents a hydrogen atom, a hydrocarbon group, an acyl group or a silyl group; m1 represents an integer of 2 to 100; and R_{4a1} and R_{4b1} may be the same or different from each other,

and the block chain B11 includes a repeating unit represented by Formula (XXI):



wherein each of R_{6a} to R_{8a} independently represents a hydrogen atom or a C1-C10 hydrocarbon group; and R_{9a} represents an aryl group.

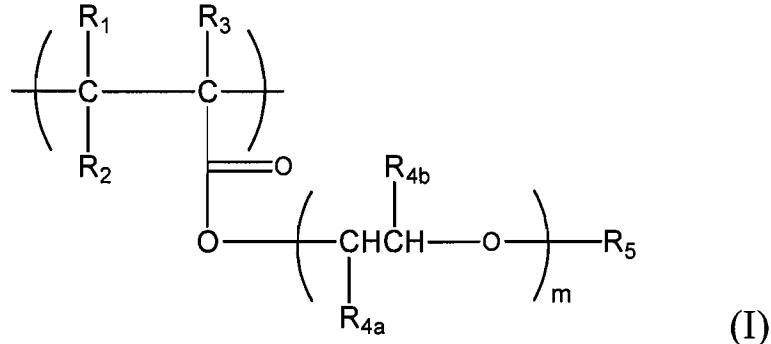
Claims 57-73 (Canceled).

Claim 74 (Withdrawn): An ion-conductive membrane comprising: a membrane which includes a polymer segment (P1) having an ion-conductivity, a polymer segment (P2) not having an ion-conductivity, and a cross-linked polymer segment (P4), wherein a network type microphase-separated structure is included in the membrane.

Claim 75 (Withdrawn): An ion-conductive membrane comprising: a membrane containing a cross-linked polymer which is obtained by a reaction of a polymer with a cross-linking agent, wherein the polymer includes a polymer segment (P1) having an ion-conductivity, a polymer segment (P2) not having an ion-conductivity, and a polymer segment (P3) having a cross-linking point, wherein a network type microphase-separated structure is included in the membrane.

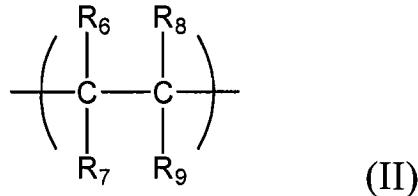
Claim 76 (Withdrawn): An ion-conductive membrane according to Claim 75, wherein the polymer forms a microphase-separated structure.

Claim 77 (Currently Amended): A copolymer having an arrangement of block chains in an order of B1, C1, A, C2, and B2, wherein the block chain A has a repeating unit represented by Formula (I):



wherein each of R₁-R₃ independently represents a hydrogen atom or a C1-C10 hydrocarbon group; R₁ and R₃ may bond to one another to form a ring; each of R_{4a} and R_{4b} independently represents a hydrogen atom or a methyl group; R₅ represents a hydrogen atom, a hydrocarbon group, an acyl group or a silyl group; m is an integer of 1 to 100, and each of R_{4a} and each of R_{4b} may be the same or different when m is 2 or more;

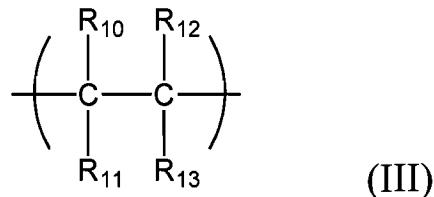
the block chain B1 has a repeating unit represented by Formula (II):



wherein each of R₆ and R₈ independently represents a hydrogen atom or a C1-C10 hydrocarbon group; R₆ and R₈ may bond to one another to form a ring; R₇ represents a hydrogen atom, a C1-C10 hydrocarbon group, a hydroxyl group, a hydrocarboxy group, a carboxyl group, an acid anhydride group, an amino group, an ester group, or an organic group having at least one functional group selected from the group consisting of hydroxyl group, carboxyl group, three-membered-ring epoxy group, acid anhydride group and amino group; and R₉ represents an organic group having at least one functional group selected from the group consisting of hydroxyl group, carboxyl group, three-membered-ring epoxy group, acid anhydride group and amino group;

the block chain B2 has a repeating unit represented by Formula (II) which may be the same as or different from B1;

the block chain C1 has a repeating unit represented by Formula (III):



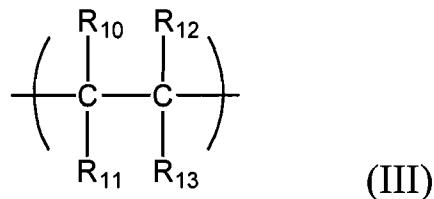
wherein each of R₁₀ to R₁₂ independently represents a hydrogen atom or a C1-C10 hydrocarbon group, and R₁₃ represents an aryl group or a heteroaryl group; and

the block chain C2 has a repeating unit represented by Formula (III) which may be the same as or different from C1.

Claims 78-95 (Canceled).

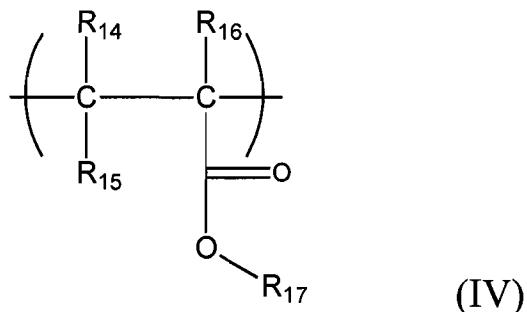
Claim 96 (Currently Amended): The polymer solid electrolyte according to Claim 26, wherein the copolymer further comprises a repeating unit derived from a polymerizable unsaturated monomer, which is different from the repeating units represented by the Formula (I) and the Formula (II).

Claim 97 (Currently Amended): The polymer solid electrolyte according to Claim [[33,]]96, wherein the repeating unit derived from polymerizable unsaturated monomers is at least one repeating unit selected from the group consisting of units represented by Formula (III)



wherein each of R₁₀ to R₁₂ independently represents a hydrogen atom or a C1-C10 hydrocarbon group, and R₁₃ represents an aryl group or a heteroaryl group;

and units represented by Formula (IV)



wherein each of R₁₄ to R₁₆ independently represents a hydrogen atom or a C1-C10 hydrocarbon group; R₁₄ and R₁₆ may bond to one another to form a ring; and R₁₇ represents a C1-C12 alkyl group, an aryl group, an alicyclic hydrocarbon group, or a heterocyclic group.